CANADA

DEPARTMENT OF MINES AND TECHNICAL SURVEYS

MINES BRANCH

OTTAWA

FUELS DIVISION

TECHNICAL MEMORANDUM 101/58-Prep.

PRESENTATION OF SIZE CONSIST

by

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(Copy No. ___)

May 30, 1958.

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90-04544/

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A new scale has been suggested by F. W. Hoglund and R. M. Lundberg* for presenting sieve-curves in a simple manner. Curves plotted by the authors appear to straighten out into parallel lines on a log-log diagram where the P-scale for the cumulative weight percent thru screen has been moved up 10 points, so that 100 reads 90; 50 reads 40; 10 reads zero, etc. The parallelism and rectilinear shape of these curves are striking.

This diagram was checked for Canadian Coals of varying rank using average sieve curves from all over Canada, as presented in Report F.R.L. - 203 by E. Swartzman.

It appears that these curves do not all follow the pattern found by Hoglund and Lundberg, depending on their rank. The lower part of the curves tend to bend upward for P-values under 20% for lower-rank coals. The presentation of the same curves on straight log-log paper shows predominantly straight lines which curve down at the top, for high-rank, friable coals.

When presenting the Hoglund curves on straight log-log paper, the lower parts of the curves tend to bend downward for P-values below 15% for some of the coals.

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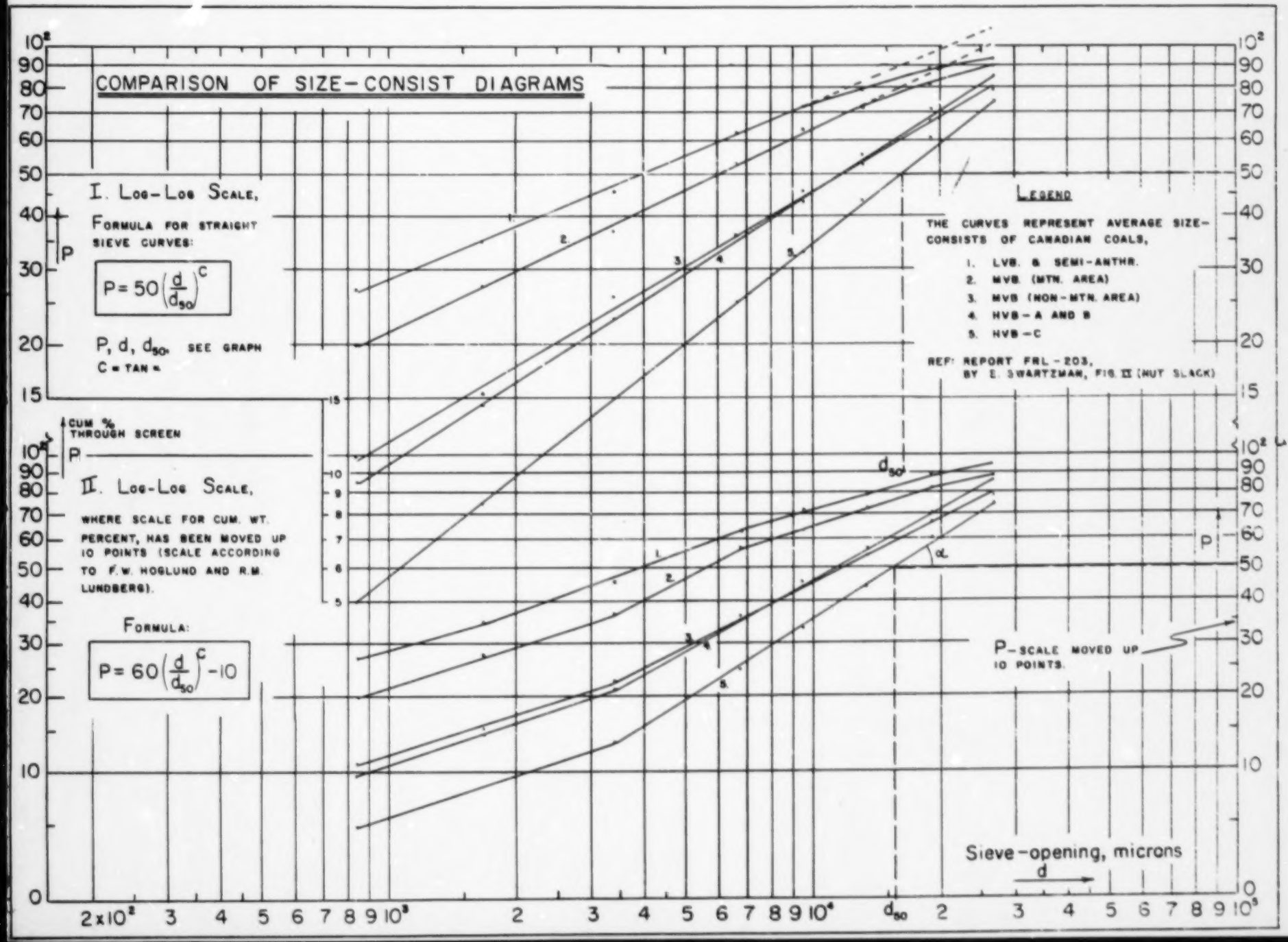
* Cons. Edison El. Co., Efficiency Bureau, E.B.R. No. 2045 (date 2-2-53)

It would appear therefore, that the suggested scale has a limited application for certain coals where it shows marked rectilinear shape and parallelism which can be used to advantage for control purposes. The scale has no general application and there is no known physical explanation to support such general application.

In conclusion it can be said that size-consist curves are subject to the laws of probability. Generally speaking, the statistical behaviour of crushed materials is not simple as may be illustrated by plotting size-consist curves on log-probability paper. However, for some coals, the curves will follow a straight line on log-log paper, or they will follow a straight line on a log-log scale with one displaced scale as suggested by Hoglund and Lundberg; or they will follow a straight line on the scale suggested by Rosin - Rammler. All these scales have a definite, but limited use, mainly for the purpose of c o n t r o l.

In the writer's opinion, when studying sieve curves in general, it is better to use log-probability paper to note the deviations from the straight line and then try to find an explanation for this departure from the straight line. In this manner, guidance is based on established theory. In all other cases it is not more than a comparison of outward appearances.


COMPARISON OF SIZE-CONSIST DIAGRAMS
I. Log-Log Scale,
Formula for straight sieve curves:
$P = 50\left(\frac{d}{d_{50}}\right)^c$
P, d, d_{50}, see graph
C = tan α
II. Log-Log Scale,
where scale for cum. wt. percent, has been moved up 10 points (scale according to F.W. Hoglund and R.M. Lundberg).
Formula:
$P = 60\left(\frac{d}{d_{50}}\right)^c - 10$
Cum % through screen
P
Legend
The curves represent average size-consists of Canadian coals,
1. LVB. & Semi-Anthr.
2. MVB (Mtn. Area)
3. MVB (Non-Mtn. Area)
4. HVB-A and B
5. HVB-C
Ref: Report FRL-203, by E. Swartzman, Fig. II (Nut Slack)
P-scale moved up 10 points.
Sieve-opening, microns
d
d_{50}
α